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ABSTRACT

This chapter describes an inservice Professional Development (PD) program for introducing a cognitive acceleration course designed to enhance students' higher order thinking capabilities. Teaching for thinking requires a specialized set of understandings and techniques, and the standard PD program described here lasts for two years and includes both center-based days and in-school coaching. The principles upon which this standard program is based and a variety of alternative modes of delivery using teacher leaders are explored. While maintaining the same basic principles of the program, modes of delivery are adapted to suit particular contexts. (Contains 21 references.) (Author)

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7 Developing and Maintaining Implementation of a Teaching-for-Thinking Program

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This chapter describes an inservice Professional Development (PD) program for introducing a *cognitive acceleration* course designed to enhance students' higher order thinking capabilities. Teaching for thinking requires a specialized set of understandings and techniques, and the standard PD program described here lasts for two years and includes both center-based days and in-school coaching. We explore the principles upon which this standard program is based, and a variety of alternative modes of delivery using teacher leaders. While maintaining the same basic principles of the program, modes of delivery are adapted to suit particular contexts.

This chapter describes a process of developing teachers' ability to stimulate their students' cognitive processing capability, and addresses problems inherent in maintaining the use of this ability. Stimulating children to raise their levels of cognitive functioning is a subtle, complex process that could never be achieved simply by following some recipe from a cookbook style teachers' guide. The reason there can be no such thing as a 'teacher-proof curriculum' is that the process of teaching is an essentially social enterprise involving myriad types of interaction between teachers and pupils. For teaching to be effective, each teacher has to find her or his own way of working with the great variety of personalities and intelligences which they meet every day. Teaching can no more be reduced to a programmed set of procedures than human activity can be mimicked by robots (Pinker, 1997).

If these principles are true for teaching in general, they are even more important when applied to teaching for the development of reasoning. We must consider what teachers of thinking need to be able to do, what normal training and experience have prepared them

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for, and how the gap between the two might be closed. Here we will focus on the inservice education of practicing teachers at the level of individual teacher, subject department within a school, whole school, and Local Education Authority. That is, we will consider both the individual teacher and the context that supports that teacher in making changes. The role of teacher leaders (whom we have called *Tutors*) in this process will be described.

Cognitive Acceleration: Successful programs

Cognitive Acceleration through Science Education (CASE) and Cognitive Acceleration through Mathematics Education (CAME) are intervention programs designed for grades 6 and 7 which have the specific purpose of developing students' higher order thinking capabilities. Their methods are rooted in Piagetian ideas of cognitive conflict and equilibration (Gruber & Vonèche, 1977), and in Vygotskyan ideas of social construction and metacognitive reflection on the development of one's own thinking (Vygotsky, 1962; Vygotsky, 1978). Activities are described in a set of pupil worksheets and teachers' lesson notes (Adey, 1993; Adey, Shayer & Yates, 1992; Adey, Shayer & Yates, 1995; Adhami, Johnson & Shayer, 1998). Schools are advised to use one of these special activities every two weeks in the place of a regular science or mathematics lesson, over a two-year period. CASE was originally developed and evaluated during 1981-87, and since then use of the program has continued to grow and evidence for its long-term effectiveness continues to accumulate. Results have been extensively reported elsewhere (Adey & Shayer, 1993; Adey & Shayer, 1994; Shayer, 1996) and here we only summarize the effects. In the original study, students in classes using CASE were shown, in comparison with matched control classes, to:

- Make significantly greater gains in cognitive development over the two years of the intervention.
- Attain higher levels in subject achievement tests one year after the end of the intervention.
- Gain significantly higher grades in nationally set examinations taken three years after the end of the intervention, not only in science (the context in which the activities had been set) but also in mathematics and English.

The CAME program is more recent, having been developed during 1993-94, but early results show that it appears to produce similar far-transfer effects on students' academic achievement (Adhami, Johnson & Shayer, 1997).

Subsequently, effects of the Cognitive Acceleration (CA) programs have been evaluated using an 'added value' methodology. The mean grades achieved in national tests of science, mathematics, and English by schools using CA are shown to be significantly higher than those of non-CA schools after school-entry mean cognitive levels are partialled out. We have argued from this long-term, far-transfer effect that the CA programs have a permanent effect on students' general intellectual processing capability.

But this is less than half of the story. CA is not a 'magic bullet'. It is not sufficient for schools simply to buy the printed materials and have their teachers follow the activities as written to produce the kind of effects that have been repeatedly demonstrated. No teachers' guide, however comprehensive, can ever convey the richness of a classroom practice that is required to raise permanently students' general levels of thinking. A substantial process of inservice teacher education is required. To understand this, we must look at the demands made on an effective teacher of thinking.

Needs of teaching for thinking

Some idea of the problem can be gained by contrasting the pedagogy required for good content instruction with that required for developing students' cognitive capability. In the former case, the content of a lesson is readily describable (e.g., "to establish a relationship between the volume of a gas and its pressure"). The content is also generally quite familiar to the teacher, who has been trained in the subject matter she or he is teaching. Furthermore, success is relatively easy to check—a quick end-of-lesson quiz will reveal the extent of students' understanding of the content. In contrast, the cognitive processes that a teacher of thinking is targeting are hidden, there is much uncertainty in their slow development, and there can be no immediate feedback to the teacher about success at the end of one or two lessons. The process is much slower and more subtle than this.

The development of critical thinking, or higher level reasoning, in children requires by definition that children be given an opportunity

to exercise their own minds, to engage in critical appraisal, to risk opinions in a sympathetic atmosphere and then have the opinions challenged in a rational but respectful manner. This means the creation in the classroom of a very special sort of atmosphere which is intellectually rigorous but at the same time friendly and safe in the sense that all children should feel confident in taking cognitive risks. To create such an atmosphere, the teacher needs to have:

- Clear objectives in terms of the type of reasoning being developed in a particular thinking lesson.
- Familiarity with the materials of a particular thinking skill program and with its underlying theory or philosophy.
- A close understanding of the range of reasoning and arguments displayed by his or her pupils, if not of the particular levels of argument employed by each individual pupil.
- The ability to 'read' an individual's response or the progress of a whole lesson in terms of the levels of understanding exhibited and the challenge provided and to offer the right type and level of stimulus in the context of the cognitive objectives of the program.
- Mastery of a range of techniques such as leading questioning, suspension of judgement, managing student peer-review of each other's arguments, setting challenges appropriate to particular children, and the ability to interpret children's utterances in terms of the type of thinking they are using.

The 'needs list' may be seen as something of a specialization in the requirements placed on any teacher, rather than a radically different type of teaching. It is, or at least should be, part of every good teachers' repertoire to be clear about objectives, familiar with teaching materials, sensitive to children's needs, and in command of questioning and other techniques. But for the development of reasoning in children, each of these requirements is raised to a higher degree, or applied to rather particular methods and materials that are quite different from the normal content-oriented curriculum.

We suggest that underlying the skills of a successful teacher for thinking lies a fundamental confidence in her or his own subject knowledge and ability to manage a class of young adolescents. Such confidence is understandably rare in student teachers, and thus it may generally be unrealistic to expect to develop effective teachers of

thinking in pre-service courses. We can however sow the seeds of curiosity and indicate what possibilities lie ahead for those interested. It takes a few years of practice for classroom management skills and pedagogical content knowledge to become well established. Only then is the time is ripe for the further professional development of teachers to upgrade their understandings and skills to the level required for the effective promotion of higher level thinking in their students.

An inservice course for CA teachers

Principles

In designing an inservice professional development program to introduce CA to teachers, we have drawn on several elements, including: research into effective staff development; research into cognitive development; our own extensive experience of running such courses; the feedback we have had from participants; and the measured effects of the courses on student cognitive gains. Here are some of the principles that have emerged from such research and experience:

- The required change in pedagogy is likely to be slow. The middle school CA program itself was designed to run over a two-year period in the belief that it would take at least that long to produce significant cognitive acceleration effects. This was based on the experience of Instrumental Enrichment (Feuerstein, Rand, Hoffman & Miller, 1980) and was borne out by a sub-trial of an intensive one-year version of the program that failed to produce the same effects as the 'regular' two-year version. A professional development course is designed to run in step with the intervention. Thus teachers are introduced to the underlying theory and the first few activities, they try them out, and then return for further inservice to share experiences and reflect on their own development.
- Change cannot be achieved through individual teachers working alone. In the initial trial of CASE, we worked with just one teacher in each school. They were enthusiastic and able, but after the trial none continued to use the activities. This was partly due to external forces (at this time a National Curriculum was introduced to schools in England) but was certainly also influenced by the difficulty these individuals encountered in trying to maintain a different type of pedagogy from that of colleagues in the

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same school. We now insist on working with whole science or mathematics departments, and build into the inservice course activities which ensure that teachers in a school share experiences, with the aim of building up a *community of practice* within the school.

- Real change is only brought about when the inservice course includes a coaching element. During the course Tutors must get into the school, into the participants' own classrooms, and with a combination of observation-and-feedback, team-teaching, and occasional demonstrations show that the techniques do work in anyone's class. Joyce and Showers (1995) have shown conclusively from a meta-analysis of research on effective professional development that courses which are only center-based and not school-based rarely bring about any real change in teaching practice. It is too easy for teachers to dismiss skills they have learned in the context of a university or professional development center as "All very nice, but it wouldn't work with my kids." Even when they have a real will to try out new techniques, the reality of school frequently overwhelms them.
- Changing one's teaching style can be a painful process, and the more experienced and successful a teacher is, the more uncomfortable they are likely to find the change process. We always warn teachers that even those who are well-respected by their students and peers, who achieve high academic levels for their students, and who have mastered to a high degree the skills of content instruction, will find themselves at times feeling like newly qualified teachers. Recognizing the pain is the first step in overcoming it, and knowing that colleagues are having similar experiences makes for a departmental atmosphere of sympathy.
- Change in pedagogy is not simply a matter of perfecting new teaching techniques. It requires, in addition, an understanding of some of the underlying theoretical principles of the CA program, and also some capability for managing the change amongst colleagues as well as personally. In the early stage of our CA PD course we introduce the theoretical constructs of cognitive conflict, metacognition, and the schema of formal operations. Over the two-year period of the program we continually refer to these 'big ideas' and relate them to practice, especially in the center-based reporting back sessions and in the in-class coaching.

Towards the end of the first year of the course, we introduce some managerial ideas such as needs analysis and action planning to the key players in a department, aiming to provide them with assistance in the management of change process (Fullan & Stiegelbauer, 1991).

- Finally, we recognize the reality that commitment often follows practice (Shulman, 1986; Stoll, 1992). One cannot expect teachers to become committed to a new approach to their craft until they have thoroughly tried it. It is often necessary to ask them to make a leap of faith into the new pedagogy, encouraging them to make this leap with the statistical evidence of the effects of CA on student academic achievement, and the stories of others who have gone before them. As one might expect, not every member of every department we have worked with over the last ten years has been prepared to make the leap!

Practice

Over the two years of the CA PD programs, there are at least seven days when teachers attend an inservice center, and a further five or six half-days when Tutors work with the teachers in their schools. A typical complete program is summarized in Table 1.

Teacher feedback plays an important role in the whole PD program. We sometimes talk as if the only purpose of teacher feedback is to inform program designers about what works and what does not so they can modify their programs. This certainly is one function of teacher feedback, and one that might be seen as a new ownership right of teachers as they implement a curriculum method. But of more direct relevance to teacher development is the opportunity that giving feedback provides for the teachers' own reflections on what they have experienced. Here we have the metacognitive processes at work. The process of sharing experiences with others involves putting into words both accounts of what has occurred during lessons, for good or ill, and an evaluation of those events in light of the overall aims of the cognitive intervention program. Participants at inservice workshops often report that the most valuable experience has been the opportunity to talk with other teachers. This is partly because teachers are somewhat isolated within their own classrooms and schools are isolated from each other. But sharing is also valuable because the process of debriefing a series of lessons in a professional environment

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Table 1
A Typical Two Year CA Professional Development Program

Year / Month	Center-based	School-based	Purpose / Activities
1 / July		1/2 day	Meet with school principal Meet with all science or mathematics teachers, outline principles, timetable, and commitment required. Provide plenty of opportunity for questions and for all to raise concerns.
1 / July	2 days		Introduction to underlying theory. Go through first 6 activities, the testing program, and administration of the pre-test. Develop individual school plans.
1 / Sept.-Dec.		1/2 day	Tutors coach and/or team-teach with teachers who are starting implementation in their own classes.
1 / Jan.	2 days		Schools give feedback on progress so far. Receive more in-depth information on theory, experience next few activities, and discuss issues around the management of change in the schools.
1 / Jan.-June		1/2 day	Tutors coach and/or team-teach with teachers in their own classes. May hold session with whole department.
1/ May	1 (+2) days		Residential convention: 1 day for CA PD participants only. Here they share experiences, work on bridging, write own "Thinking" type materials. Two extra days can be attended by participants who are new to CA or 'old hands'.
2 / Oct.	1 day		Experience more activities. Update school plans, and consider further management issues.
2 / Oct. - May		2 x 1/2 days	Tutors coach and/or team-teach with teachers in their own classes. May hold session with whole department.
2 / June	1 day		Post-test and collect data. Forward plans. Network for continuing support.

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gives one a safe opportunity to re-live experiences and bring to consciousness, perhaps for the first time, the extent to which the intended structure of the lesson was managed. The rediscovery of Dewey's (1933) recognition of the role of teacher reflection (Zeichner & Tabachnick, 1991) is encouraging to the enterprise of those involved with change in classroom practice.

While we insist on working with whole departments, it is not practical for every science or mathematics teacher in a school to come to the "center days" that are held during normal school time. We do, however, insist that at least two teachers from each department attend, giving them a chance to interact with each other and consider how the messages of the inservice days may be translated into the context of their school. Typically one participant from a school will be the *CA coordinator* in the school, and participation may rotate among others in the group, with a different person coming to each occasion. This provides a balance between continuity and exposure to the PD program by as many teachers in a department as possible. In addition to our own input in the schools, CA coordinators are encouraged to develop implementation plans that include in-school sessions that they facilitate. We use part of our school visit time to support the coordinator in his or her in-school sessions, and provide every school with a comprehensive pack of PD materials (Adey, 1993).

To summarize the features of CA PD, it involves:

- Targeting a whole department in a school over a two-year period.
- Working intensively with one or two teachers, but offering all members of the department support.
- Dealing with the practicalities of the materials and activities, the underlying theory, and the management of change.

Even though this is a relatively expensive program for a school to commit to, we always have more applicants than we can accept. This is a reflection of the perceived value of CA.

Some evaluation

As part of a continuing process of evaluation of the effects of CA PD and the factors which influence change in schools (Adey, 1997; Adey, Dillon & Simon, 1995), we have looked at the longevity of effects of one of the PD courses. During the academic year 1998-99, we visited twelve schools that had been enrolled in the 1994-96 CASE

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program to see what effects were still discernible in the schools. Three undergraduate psychology students conducted interviews with key teachers, gave questionnaires to students who had been in grades 6 or 7 at the time, and collected data on cognitive gains. In brief, in five of the schools the CASE program was being maintained by the science department with regular in-school inservice opportunities for new teachers, and support meetings. These schools reported some difficulty in maintaining the impetus, but in every case one or two key individuals who had participated in the CASE PD program had made it their responsibility to keep active the CA methods of teaching. In two schools, some teachers were continuing to use CASE and enjoying it, but the approach was not integral to departmental expectations. In the remaining five schools, there was little or no CASE teaching continuing. A study of the reasons for these 'failures' is illuminating. In two cases, the innovation had never really taken root from the start. In the remaining three cases, the initial implementation had been quite thorough, but the impetus for the innovation remained in the hands of just one or two key people. When supportive individuals left a school, often to promotion in another school where their CASE expertise was valued, their former departments did not maintain the methods.

Although the standards we set for longevity were high, this is not a particularly happy story. It does suggest, though, some essential factors for successfully cultivating permanent change in practice. Pedagogic practice is embedded within the professional behavior of people, but it also requires the right sort of managerial environment. The school principal or another senior administrator has to be convinced of the value of an innovation to provide the funding and time needed, and individual teachers have to commit themselves to the sort of uncomfortable learning described earlier. When one or two trained and committed people move from one school to another, the school that funded the training may be left without a critical mass of teachers with the appropriate attitude and expertise. Additionally, the teachers who move may find it difficult to put their newly developed skills into practice in new departments that have had no exposure to the specialist coaching.

Another lesson learned is that the transfer of an innovative practice from one teacher to another within a department is a far more difficult process than we had imagined. When initially committing to the project, principals seemed to believe (and we probably did not do enough to disabuse them of this belief) that the seven inservice days

plus five half-day visits to the schools were sufficient to change the pedagogic culture of a school. It is not. To the basic program must be added plenty of time for the teachers within a department to share practices, observe one another, think through the underlying theory, face resistance, and generally achieve a deep sense of ownership of the new methods.

Consequently, we have modified our basic program for schools in the light of this small evaluation study, but more significantly, we have shifted the emphasis of our work from individual schools towards wider systemic change, which will be described in the next section.

CA Tutors

We have described the standard CA PD course in some detail, as it is necessary to see what is required of Tutors who run such courses. This section will elaborate on the various types of teacher leader systems we have developed. From the start of our PD programs in 1991 we have offered, in parallel with our work with individual schools, courses for CA Tutors. These are people who, in addition to developing the skills and understanding of CA teachers, are prepared to run CA PD courses themselves for individual schools or clusters of schools. These individuals typically are either university faculty members or Local Education Authority (LEA*) advisory teachers or inspectors. They may also be freelance consultants or regular teachers. They participate in the same course as CA teachers, and they also are required to teach a large proportion of the CA activities. For those who have been out of the classroom for some time, this is often a salutary experience. It is considered essential for any CA Tutor to have first hand experience with the activities and the special pedagogic techniques of the program. In addition, they accompany the regular Tutors on their coaching visits to schools, initially observing the coaching process, then sharing in it, and finally conducting coaching visits themselves, while being observed by an experienced Tutor.

Some Models of Tutor Implementation

In this section, we provide some thumbnail sketches to exemplify the way that different CA Tutors have developed constituencies of CA

* In the United Kingdom, schools are administered directly by a Local Education Authority. A small suburban LEA may have as few as six secondary schools and twenty primary schools, while a large urban or county LEA could have sixty secondary and hundreds of primary schools.

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training while retaining contact with, and drawing on the expertise of the CA originators.

A University-based model

Two lecturers in the School of Education at Keele University participated in the full CA Tutors' course at Chester, and they worked with many schools in the Northwest. Now they provide CA courses for a wide variety of schools in the region of their own university. They maintain contact with the core team through the annual CA convention, and share participation in other CA events, such as invitations to present at the Scottish National CA Convention, or CASE days run by the University of Birmingham.

An LEA-Based Model (1)

Birmingham is Britain's second largest city. Readjusting to a modern economy from a long tradition of heavy industry (steel and car building), Birmingham typifies many large cities in the post-industrial era, with poverty and urban depredation. There is also significant renewal in the city and a popular culture that now owes as much to the Indian sub-continent and to Afro-Caribbean influences as it does to the traditional white working class of the Midlands.

In 1997, the Chief Education Officer of Birmingham made a commitment to introduce CA methods into all of the city's secondary schools. Two individuals were appointed as trainee CA Tutors, and an initial set of 17 schools volunteered for the first training cohort. Tutors from King's College London (the original source of CA) ran the initial training course for these schools at a Teachers' Professional Center in Birmingham, assisted by the trainee Tutors. Over a period of three years, new cohorts of schools joined the effort, the King's Tutors gradually withdrew their input, and the two Birmingham Tutors accepted more and more responsibility. By September 1998 the Birmingham Tutors were successfully training CA cohorts on their own.

An LEA-Based Model (2)

Sunderland, in the North East of England, is a smaller educational authority than Birmingham, but shares much the same post-industrial trauma and renewal. In 1991, the Sunderland LEA identified a science teacher as having the potential to become a CASE Tutor and sent her to the first CA Tutor program offered at King's College in London. She began working with a group of five Sunderland schools, including

her own from which she was given part-time release. Within three years, these schools started to show the sort of long-term effects which had been seen in schools working directly on the CA PD course. In due course, the new CASE Tutor became a university lecturer and moved out of the Education Authority position. But one of the teachers she had worked with (the second author of this chapter), took over the tutoring role while also introducing the CAME project in 1997. The Authority has further expanded the training from 1999 to 2002 aiming to offer the CAME and CASE training as part of its standard provision for all secondary schools.

The training model drew heavily from the basic features of the King's model described earlier, but was tailored to suit the particular context of the Sunderland schools. The distinguishing feature of this model is that the LEA made a deep commitment to introducing CA to its schools, and expressed this commitment by providing funds for a full time Tutor. This allowed more time to be devoted to each school than could normally be provided if the schools had to fund the whole PD themselves. Key aspects of the Sunderland model are summarized below.

- The intervention is viewed as experiential and school specific, with the Tutor being able to adapt to individual institutional needs over the two years of major support. The role of the Tutor is critical. The Tutor is viewed as a supportive and experienced friend of the teachers because he was recently a teacher himself and also because his role is not associated with the formal Authority Advisory Service. The Tutor has a number of responsibilities: observing and coaching, facilitating departmental meetings, presenting training sessions for teachers and facilitating a local conference.
- There is a wide range of Tutor support available for each department and teacher involved. This support includes 14 half-day meetings over a period of seven terms* and includes a local CAME/CASE conference each autumn. In three of these meetings, the Tutor presents a CA lesson that teachers observe

* The British academic year is broken into three terms: winter (September-Christmas); spring (New Year-Easter); and summer (Easter-July). The seven terms referred to here start with the summer term at the end of one year, and continue through the end of the summer term two years later.

and critique. Each teacher also receives at least 14 lesson visits from the Tutor over the two years. Teachers have a number of experiences: observing and coaching, demonstration teaching, team-teaching, chairing meetings, analyzing videos, and assisting in presenting training sessions. The use of coaching leads to the development of a common set of standards among the teacher group.

- There is a strong focus on the use of video materials. Teachers discuss videos of the Tutor delivering CA lessons, and the Tutor and teacher critically review videos of the teachers' lessons. Later, as the teachers' confidence grows, they begin to share their videos with other teachers. The use of video and written notes as part of the feedback process, together with the theoretical input from the training sessions, promotes reflection and evaluation and enables the teachers to move from an intuitive feel for the activities to a strong internalization of the theory.

This general process can be illustrated with some specific examples of schools that have participated in the program. The brief sketches are intended to give a flavor of the variety of activities that take place in different schools and the flexibility that is possible within the Tutor-led LEA-based model.

School 1.

This school is known for achieving high levels of academic success for its students. The departmental interest in CASE arose from dissatisfaction with the senior students' performance in a university entrance course due to poor reasoning and communication skills. All fifteen science teachers decided to participate in in-school sessions in which they observed a demonstration CA lesson. They also agreed to the Tutor observing half the department's teachers. Time was given to both individual and departmental feedback on lesson practice.

School 2.

School 2 was identified as having problems with poor examination results, so the senior management decided that the school should adopt CAME. The math department consisted of four committed teachers who had all been teaching for some twenty years. Good communication was a strong feature of this department. After just one term of CAME they reported finding the materials and the support

of the tutor refreshing. The department thrived with the opportunity to observe themselves on video and also to observe the Tutor. Some teachers even used their video materials as part of their higher degree work. Each teacher was keen to observe and be observed. The department was strengthened with a high level of discussion and collaboration. The Tutor was used in the discussions to provoke and stimulate debate about the nature of teaching and learning. This department quickly became committed to the CAME approach because the training model impacted their teaching, rather than because of the potential examination improvements promised.

School 3.

Although this school had students achieving high levels of academic success, the department had a problem with communication. The teachers were teaching chemistry, physics and biology separately, not as integrated science as it is in most 6th and 7th grades in Britain. There was little effective discussion about teaching and learning at the departmental meetings. When the Tutor first attended the departmental meeting, he had a rather negative experience. CASE was allocated to the last item on the agenda and limited to a five-minute outline of the project. Nonetheless, the introduction of CASE caught the attention of one subject head. He became keen to modify the culture within the science department, and he saw CASE as a vehicle by which this might be achieved. He secured the principal's support and invited the Tutor to demonstrate a series of CASE lessons for the teachers. Following this experience, the majority of teachers in the department began to engage in regular reflective dialogue. This dialogue began to take place during departmental meetings, with the results that three years down the line, the departmental culture had significantly changed. Staff members are now willing to observe each other and be observed. On school visits by the Tutor, several teachers are keen to discuss recent lesson experiences and to brainstorm future lesson plans and ideas.

School 4.

Inspectors had criticized the science department at School 4 for their poor understanding of pedagogy and their limited use of different teaching and learning styles. In the first year, the Tutor worked with two teachers piloting the CASE materials. The following year, the Tutor did demonstration teaching for all the teachers in the department.

The teachers wrote notes and discussed each lesson initially with the Tutor and later with the experienced CASE teachers. During these discussions, the Tutor and a CASE experienced teacher agreed to focus on different areas of discussion. One person focused on the cognitive agenda while the other focused on the social agenda. The result over the first term was a real change in the level of discussions among the members of the department. The discussions moved from an abstract level to one where actual evidence from lessons was shared. All members of the department could contribute to these discussions.

A Consultant Model

One member of the first cohort of Tutors' programs (1991-2) participated while he was employed as an Authority Advisor. Shortly thereafter he took early retirement, and since then has been running a range of CA training programs in the North of England working as an independent consultant. He is experimenting with a somewhat different technique for coaching in which teachers send video recordings of themselves teaching and he provides detailed written feedback on the videotaped lessons. This process is still being evaluated. If it can be shown that it provides coaching as effectively as the normal face-to-face method then it will be worth developing as a significantly more economical approach.

Monitoring, Accreditation, and Maintenance

CA work is now becoming quite extensive throughout the United Kingdom. As well as the work in England, some of which has been described here, many Authorities in Wales are actively engaged in CA Tutor programs, there are four CASE Tutors established in Northern Ireland, and the first National Scottish CA Convention was recently held in Stirling. Gratifying though this widespread enthusiasm for CA is, it does bring with it a set of concerns about monitoring and maintaining the quality of training. At the present time we have barely begun to address this issue in a systematic manner, but here is one approach:

A *CASE Network* has been established as a users' group independent of the initiators at King's College and free of commercial interests. The Network is developing as a professional body of Tutors and teachers for disseminating information about CA. However, its most important role in the context of monitoring is to produce an

agreed upon set of criteria for the accreditation of CA Tutors. The Network will have a professional affairs committee to oversee this accreditation process and in the future any potential client of CA training will be able to ensure that Tutors they employ meet the standards of experience and training set by the Network. Built into the accreditation criteria is a requirement for re-accreditation every few years so as to ensure the maintenance of training standards.

Cognitive Acceleration for Elementary Schools

Finally, we should mention a new project still in the early experimental stage that is likely to cause considerable headaches on the professional development front. This project examines the possibilities for CA with five-year-olds. This is not the place to provide detail of this project, which has yet to produce any results. Enough work has been done, however, to indicate that the professional development program will offer a real challenge. Primary schools do not have departments as secondary schools do, and therefore, teachers act at a far more individual level. Furthermore, these teachers are frequently moved from one grade to another, and often teach for only a few years before moving on to other things. All of these circumstances mean that it is difficult to know how to design the professional development effort. At this time, we suspect that the answer will be a multi-level one. It will involve work with individual teachers, additional work at the school level involving subject coordinators and principals, and also work with the establishment of an Authority-wide structure for continual induction of new teachers as they join the system. Solving this problem is offering us a challenging, but exciting, task.

Conclusion

Here we have tried to present a sense of the complexities involved in introducing a nationwide shift in pedagogic practice. We have developed a range of delivery mechanisms that aim for flexibility and the recognition of individual differences in needs at the teacher, school, and regional levels. In spite of the variations, there are some constant features we take to be essential for the development of teachers' ability to raise student cognitive levels. These constants include allowing up to two years to work with teachers to establish permanent change, an emphasis on the underlying theory of constructing thinking capability, and a commitment to provide

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professional development to teachers within their schools. Whatever the aims of a particular program may be, we believe that these constants are worthy of serious consideration by anyone responsible for the professional development of teachers.

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